WPIM-E1

LOCAL MANAGEMENT GUIDE

CABLETRON SYSTEMS

The Complete Networking Solution™

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CAUTION: ALWAYS DISCONNECT THE E1 BOARD (THE ONE WITH THE TELEPHONE PLUG/JACK) FROM THE TELEPHONE SYSTEM WHEN INSTALLING OR WHEN THE COVERS ARE REMOVED FROM THE HOST PRODUCT.

Achtung: Das WPIM-E1 Modul darf nur von qualifiziertem Service Personal in TÜV-zugelassenen Geräten installiert werden. Vor dem Einbau muß in der Installationsanweisung und Funktionsbeschreibung des Gerätes überprüft werden ob das Modul kompatible ist und verwendet werden kann.

Achtung: Die Verbindung zu dem E1-Modul (die Karte mit dem Telefonanschluß) muß bei Installationen getrennt werden.

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CHAPTER 1

INTRODUCTION

Welcome to the Cabletron Systems *WPIM-E1 Local Management Guide*. This manual explains how to use Local Management to control and manage the Cabletron Systems WPIM-E1. Appendix A of this guide provides connector and pinout information for the WPIM-E1.

The WPIM-E1 resides in and provides connectivity/functionality to Cabletron Systems Wide Area Network (WAN) modules such as the BRIM-W6.

Before using this manual you must:

- Install the WPIM-E1 in a Wide Area Network module. Refer to the appropriate manual (i.e., the *BRIM-W6 User's Guide*) for installation and troubleshooting procedures.

- Setup and access Local Management. Refer to the appropriate MIM, standalone hub, or module User's Guide for instructions on setting up and accessing Local Management.

1.1 USING THIS MANUAL

Read through this manual completely to familiarize yourself with its content and to gain an understanding of the features and capabilities of the WPIM-E1. You should have a general working knowledge of the following data communications networks and their physical layer components before using the WPIM-E1.

- WAN
- Ethernet and IEEE 802.3
- Token Ring and 802.5

The following list briefly explains each chapter of the WPIM-E1 manual:

Chapter 1, **Introduction**, outlines the contents of this manual, describes WPIM-E1 features, lists specifications, and concludes with a list of related manuals.

Chapter 2, **Local Management**, describes how to use Local Management to setup the WPIM-E1.

Appendix A, **WAN Interface Cable Specifications**, provides Cabletron part numbers and connector information for the interface cables used with the WPIM-E1.

Appendix B, **WAN Terms and Acronyms**, is a brief glossary of the terms used in this book.

1.2 GETTING HELP

If you need additional support related to the WPIM-E1, or if you have any questions, comments, or suggestions concerning this manual, contact Cabletron Systems Technical Support:

By phone .....(603) 332-9400
Monday-Friday; 8am - 8pm Eastern Time
By CompuServe .....GO CTRON from any ! prompt
By Internet mail .....support@ctron.com
By FTP .....ctron.com (134.141.197.25)
Login: *anonymous*, Password: *your email address*

1.3 WPIM-E1 FEATURES

The WPIM-E1 extends the functionality of your Wide Area Network module to allow remote connectivity using WAN services such as E-1 or Fractional E-1.

The WPIM-E1 provides an E-1 interface that includes a built-in Channel Service Unit/Digital Service Unit (CSU/DSU) for direct connection to an E-1 line. This WPIM supports both Full E-1 or Fractional E-1 using 56 or 64 Kbps timeslots.

WAN Protocols

As of this printing, the module in which the WPIM-E1 is installed supports the following WAN protocols (refer to the Release Notes included with the host MIM or standalone hub for a list of current protocols):

- Point to Point Protocol (LCP) as defined by RFC 1661
- Point to Point Protocol (BNCP) as defined by RFC 1638
- Point to Point Protocol LAN Extender (PPP/LEX)
- Frame Relay as defined by RFC 1490

MIB Support

Refer to the Release Notes included with the host MIM or standalone hub for a list of all MIBs supported by the WPIM-E1. For information about how to extract and compile individual MIBs, contact Cabletron Systems Technical Support (see **Getting Help**).

1.4 WPIM-E1 SPECIFICATIONS

This section describes the environmental specifications and safety/approval requirements for the WPIM-E1. Cabletron Systems reserves the right to change these specifications at any time without notice.

Environmental Requirements

Operating Temperature:	+5° to +40°C (41° to 104°F)
Non-operating Temperature:	-30° to +90°C (-22° to 194°F)
Operating Humidity:	5% to 95% (non-condensing)

Safety

This unit meets the safety requirements of EN60950.

EMI

This unit meets the EMI requirements of EN55022 Class A and VCCI Class I.

EMC

This unit meets the EMC requirements of EN50082-1 including IEC 801-2 (ESD), IEC 801-3 (Radiated Susceptibility), and IEC 801-4 (EFT/B).

It is the responsibility of the person who sells the system to which the WPIM-E1 will be a part to ensure that the total system meets allowed limits of conducted and radiated emissions.

1.5 RELATED MANUALS

Refer to the manual included with the host Wide Area Network module (e.g., the *BRIM-W6 User's Guide*) to supplement the procedures and other technical data provided in this manual. Refer to the MIM, standalone hub or module User's Guides and/or Local Management Guides for Local Management setup information. This manual references procedures in these manuals, where appropriate, but does not repeat them.

CHAPTER 2

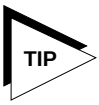
LOCAL MANAGEMENT

This Chapter explains how to configure the WPIM-E1 through Local Management. The **WAN Physical Configuration screen** and the **WAN Interface Configuration screen** appear as Local Management menu selections after you install the WPIM-E1 into a WAN module such as the BRIM-W6 and then install the BRIM into a MIM or standalone hub. Refer to the MIM or standalone hub User's Guide for instructions about how to setup and access Local Management.

Sections of this chapter include:

- The WAN Physical Configuration screen 2.1
- The WAN Interface Configuration screen 2.2
- Full T-1 Configuration Using PPP 2.3
- Fractional T-1 Configuration Using PPP 2.4
- Frame Relay Configuration 2.5
- LEX Configuration 2.6

Read Sections 2.1 and 2.2 to gain an understanding of the WPIM-E1 Local Management screens. Sections 2.3 through 2.6 provide examples for setting up the WPIM-E1 for full or fractional E-1 in a PPP environment, or for configuring the WPIM-E1 for LEX or Frame Relay.



Navigate through the WPIM Local Management Screens by using the following keyboard commands:

SPACEBAR to toggle between selections in a field.

ENTER (RETURN) to implement a selection.

Arrow keys to move up, down or sideways within the screen.

2.1 THE WAN PHYSICAL CONFIGURATION SCREEN

To access the WAN Physical Configuration screen from the Feature Selection screen, use the arrow keys to highlight the WAN Configuration option, then press ENTER. The screen shown in Figure 2-1 appears.

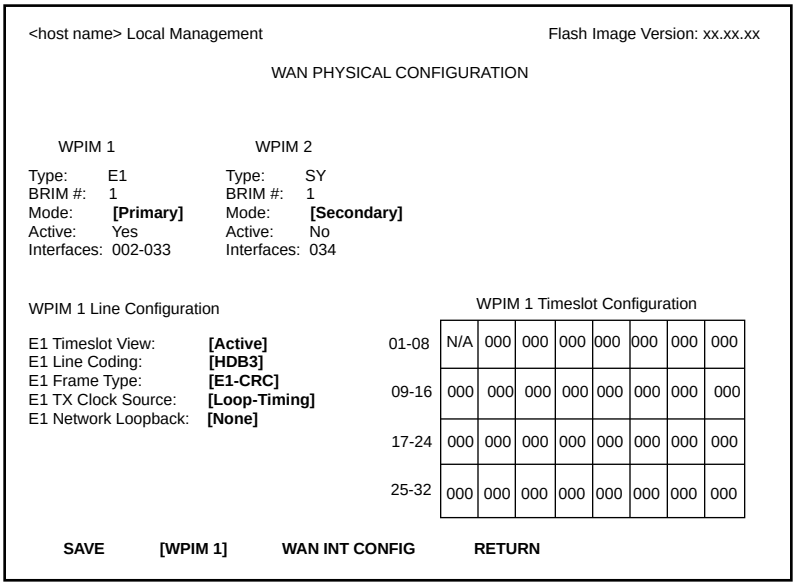


Figure 2-1. WAN Physical Configuration Screen

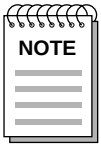
2.1.1 WAN Physical Configuration Screen Fields

The following sections describe WAN Physical Configuration screen fields and instructions for setting them. The WAN Physical Configuration screen lets you configure the WPIM or “Physical Interface.”

Cabletron offers a variety of WPIMs. The following Physical Configuration screen examples show the WPIM-E1 and the WPIM-SY. Select the WPIM you wish to configure by using the arrow keys to highlight the WPIM command field at the bottom of the screen. Press the SPACEBAR to select the appropriate WPIM, then press ENTER. The WAN Configuration screen automatically displays unique configuration fields for each WPIM as shown in Figure 2-1.

The WAN Physical Configuration screen displays the following information for each WPIM:

WPIM *1-4*
Displays configuration information for as many as four WPIMs.



Each BRIM-W6 supports two WPIMs. Some of Cabletron's products (e.g., the NBR-620 or the EMM-E6) will support two BRIM-W6 modules providing connectivity for as many as four WPIMs. ***Only one WPIM per BRIM-W6 can be active****.*

Type
Displays the WPIM type.

BRIM #
Displays the BRIM slot in which the WPIM resides.

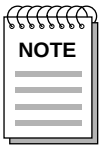
Mode
Displays the WPIM mode. Toggles between Primary and Secondary. In a device such as the BRIM-W6 where two WPIMs are utilized but only one can be active at a given time, the second WPIM installed or recognized defaults to Secondary.

Active
Displays the status of the WPIM, Yes and No.

Interfaces
Displays the interfaces available to each WPIM.

2.1.2 WPIM-E1 Configuration Fields

The configuration fields displayed on the Physical Configuration screen shown in Figure 2-1 vary depending on the type of WPIM. The examples in this Local Management Guide cover the WPIM-E1. Each Cabletron WPIM has a Local Management Guide that provides specific configuration guidelines and examples.



The service provider determines the settings for the following fields. Consult the service provider for the correct settings.

E1 Timeslot View

Displays the status of the Timeslot Configuration Table. The selections for this field toggle between Active and New. The Active setting displays current Timeslot Configuration table settings. The default setting is **Active**. The New setting allows you to change Timeslot Configuration table settings. The default setting for the Timeslot Configuration table is all Timeslots not assigned (**000**).

E1 Line Coding

Displays the line coding for the physical E-1 line. The selections toggle between HDB3 and AMI. The default setting for this field is **HDB3**.

E1 Frame Type

Displays the E-1 Frame type. The selections toggle between E1 and E1-CRC. The default setting for this field is **E1-CRC**.

E1 Tx Clock Source

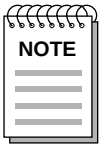
Displays the E-1 Transmit Clock Source. The selections for this field toggle between Loop-Timing (Extracted Line Data) and Local-Timing (Internal Clock). The default setting for this field is **Loop-Timing**.

E1 Network Loopback

Network Loopback is a testing procedure that segments the line and allows the user to isolate faults. The selections for this field toggle between None and Line-Loop. In Line-Loop all 32 channels are looped back to the E-1 line.The WPIM-E1 must be in Loop-Timing mode to use this option. The default setting is **None**.

2.1.3 The WPIM Timeslot Configuration Table

The WPIM Timeslot Configuration Table allows the user to configure the way in which the Cabletron WAN module uses the E-1 line. The configuration table consists of 32 Timeslots. Only 31 of the Timeslots are available for use because the first Timeslot is used by the device to transmit framing data. **N/A** (Not Available) always appears in Timeslot #1. You must assign each of the remaining 31 Timeslots an **Interface** number (for example, 002 for an active Interface number or 000 if the Timeslot is not used). When you lease an entire E-1 line, you can use all 31 Timeslots (the full E-1 bandwidth). If you lease only a fraction of the E-1, the service provider tells you which Timeslots to use.



The WPIM-E1 always uses the first Timeslot (Timeslot #1) to transmit framing data. A full E-1 line with 32 Timeslots has 31 customer-usable Timeslots.

You can utilize Timeslots any way you choose. The WPIM-E1 supports Time Division Multiplexing (TDM) allowing channelization of circuits (Timeslots) within the public network. For example, if your BRIM-W6 has access to a full E-1 (31 customer-usable Timeslots), and you want to communicate with two other sites, your configuration might look like Figure 2-2.

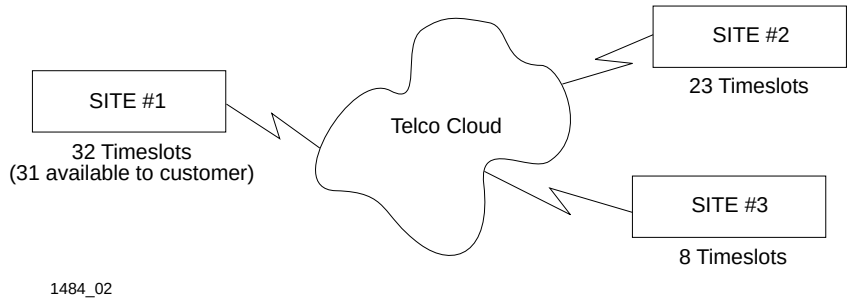


Figure 2-2. Sample Timeslot Configuration

Figure 2-3 shows a sample configuration for three sites. Of the 32 Timeslots, Site #1 uses the first Timeslot for transmitting framing data, 23 Timeslots to communicate with Site #2 and the remaining 8 Timeslots to communicate with Site #3. This configuration varies tremendously depending on how the service provider maps out the E-1 Timeslots. Your service provider will tell you which Timeslots are active and where they go in the cloud.

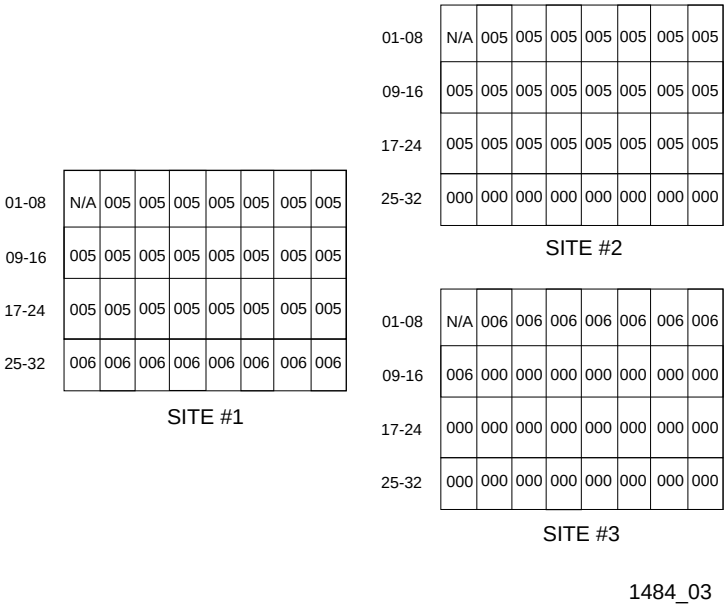
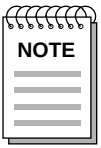


Figure 2-3. Sample Configuration

Site #1 is using the full E-1, so all the Timeslots must have an Interface assignment. Site #2 and Site #3 only use a fraction of the E-1, but the total quantity of Timeslots must match those of Site #1. Unused Timeslots receive an Interface number of 000.



The Interface numbers of Site #1, Site #2 and Site #3 do not have to match. Only the ***quantity*** *of Timeslots must match (the service provider assigns the Timeslots).*

2.2 THE WAN INTERFACE CONFIGURATION SCREEN

This section describes the features of the WAN Interface Configuration screen. Access the screen by using the arrow keys to highlight the **WAN Int Config** option at the bottom of the Physical Configuration screen, then press ENTER. The WAN Interface Configuration screen shown in Figure 2-4 appears.

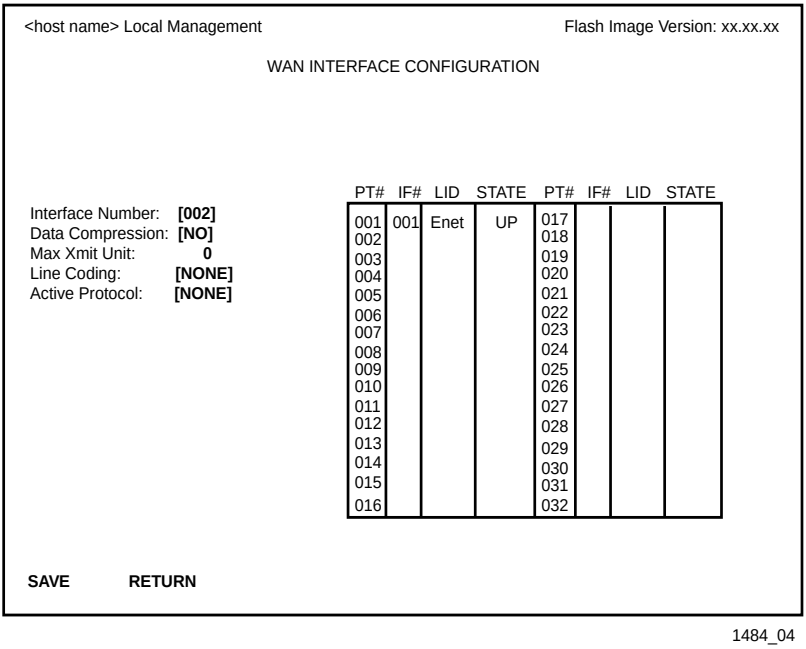

<host name> Local Management
Flash Image Version: xx.xx.xx
WAN INTERFACE CONFIGURATION
Interface Number: [002]
Data Compression: [NO]
Max Xmit Unit: 0
Line Coding: [NONE]
Active Protocol: [NONE]
PT# IF# LID STATE PT# IF# LID STATE
001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016
001 Enet UP
017 018 019 020 021 022 023 024 025 026 027 028 029 030 031 032
SAVE
RETURN
1484_04

Figure 2-4. WAN Interface Configuration Screen

2.2.1 WAN Interface Configuration Screen Fields

This section describe the WAN Interface Configuration screen fields.

Interface Number
Displays the active Interface Numbers. Use this field to configure the Interface Numbers you assigned to the Timeslots on the WAN Physical Configuration screen.

Data Compression
Displays the status of Data Compression. This field displays YES or NO. The default setting is **NO**.

Max Xmit Unit
User-configured field that displays the maximum packet size that can be transmitted on the selected Interface. The default values are **8191** for PPP and **4095** for Frame Relay.

Line Coding
Displays the Line Coding for Timeslots associated with this interface. This field displays JBZS, INV-HDLC, or None. The default setting is **None**.

Active Protocol
Displays the active OSI Layer protocol. This field displays None, FR (Frame Relay), or PPP (Point-to-Point). The default setting is **None**.

If you select **PPP**, the following field appears:

PPP Type: This field displays BNCP or LEX.

If you select **FR**, the following field appears:

FR LMP: This field displays NO LMI, Q.933-A or T1.617-D. This field is normally set to **Q.933-A** (the European standard). The NO LMI setting is for specialized applications in which no Frame Relay Link Management is available or required.

If **NO LMI** is selected, the following fields are displayed:

DLCI Address: This field can be set to values from 0-1023. The values 0-15 and 1008-1022 are reserved DLCI addresses.

Circuit State: Toggles between Active, Inactive and Invalid.

PT#
Displays the application ports (bridge ports) available from the host platform to the WAN. If the active protocol is PPP, Local Management assigns only one application port per interface number (IF#). If the active protocol is Frame Relay, Local Management assigns the available WAN bridge ports from the host platform, one per DLCI.

You can assign WAN application ports to the 31 interfaces for the PPP configuration that suits your needs. In a Frame Relay configuration, you can assign all WAN application ports to one interface. In this example, the remaining 30 interfaces would not have WAN application ports available.

The quantity of application ports for a Frame Relay network is determined by the quantity of DLCIs (Data Link Connection Identifiers) assigned to that Interface. This is determined either manually or by the LMP (Link Management Protocol).

IF#
Displays the Interface that is associated with the application port.

LID
Displays the Link Identifier. If the active protocol is Frame Relay, the Data Link Connection Identifier is displayed. If the active protocol for this interface is PPP, then PPP appears in this field.

STATE
Displays the status of the application port. If the active protocol is Frame Relay, this field displays the status as Active, Inactive, or Disabled (for No LMI). If the active protocol is PPP, this field displays UP (for active) or DOWN (for inactive).

2.3 FULL E-1 CONFIGURATION USING PPP

This section provides step-by-step instructions for configuring the WPIM-E1 to use a full E-1 circuit in a PPP environment. This simplified example assumes the setup shown in figure 2-5 using a MicroMMAC hub with a BRIM-W6 containing a WPIM-E1 at Site #1. Configurations may vary depending on the hub.

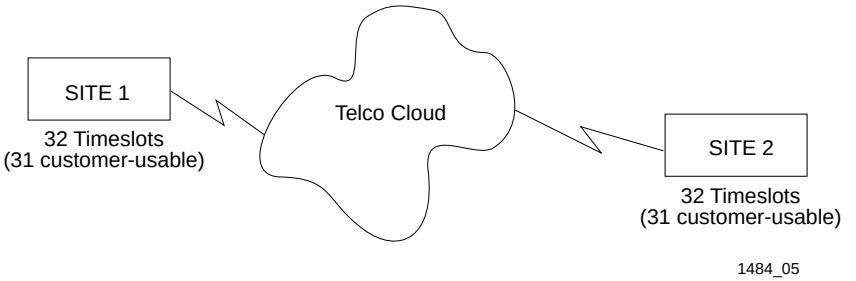


Figure 2-5. Full E-1 Configuration

The line configuration information shown in Table 2-1 must be supplied by the service provider.

Table 2-1. Telco Configuration Information

Configuration Information Required By User	Configuration Information Supplied By Service Provider
Line Coding	HDB3 or AMI
Frame Type	E1 or E1-CRC
Clock Source	Loop Timing or Local Timing

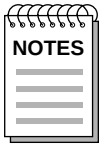
2.3.1 WPIM-E1 Physical Configuration

Begin the WPIM-E1 configuration by accessing the WAN Physical Configuration screen through Local Management (Figure 2-1). Access the WAN Physical Configuration screen from the Feature Selection screen that first appears when you enter Local Management. Use the arrow keys to highlight the **WAN Configuration** option, then press ENTER. The screen shown in Figure 2-1 appears. Proceed with the following steps:

1. Use the arrow keys to highlight the **[WPIM]** field at the bottom of the screen. Press the SPACEBAR to select the WPIM being configured, then press ENTER.

2. Use the arrow keys to highlight **Timeslot View**. Press the SPACEBAR to select **New**, then press ENTER. The cursor moves to Timeslot #2 of the Timeslot Configuration Table.

3. Insert an interface number (see NOTE below) into every Timeslot. Type the number, press ENTER, then use the arrow keys to highlight the next Timeslot field. Exit this field by using the arrow keys. The cursor automatically moves to the **E1 Line Coding** field.



The value assigned to the Timeslots is the interface being used for WAN communication. The available interface range is displayed on the WAN Physical Configuration screen (see Figure 2-1). You may insert any of the available interface numbers into the Timeslots.

In the example shown in Figure 2-1, the interface range for the MicroMMAC with a WPIM-E1 in slot one of the BRIM-W6 is 2-33. Although any of these values may be used, Cabletron Systems recommends using the first available interface number (in this example interface #2).

The following three steps are based on information supplied by the service provider. Consult the service provider for the correct settings.

4. Use the arrow keys to highlight **E1 Line Coding**. Press the SPACEBAR to select **HDB3** or **AMI**, then press ENTER.

5. Use the arrow keys to highlight **E1 Frame Type**. Press the SPACEBAR to select **E1** or **E1-CRC**, then press ENTER.

6. Use the arrow keys to highlight **E1 Tx Clock Source**. Press the SPACEBAR to select **Local** (no clock source provided by telephone company) or **Loop** (clock source provided by telephone company), then press ENTER.

If you are using a Local clock source, set only one end of the circuit for Local, the other end must be set for Loop.

7. Use the arrow keys to highlight **E1 Network Loopback.** Press the SPACEBAR to select **None**, then press ENTER.

8. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.

9. Access the WAN Interface Configuration screen by using the arrow keys to highlight the **WAN Int Config** option, then press ENTER.

2.3.2 WPIM-E1 Interface Configuration

This screen is accessed through the WAN Physical Configuration screen. Refer to Figure 2-4 and proceed with the following steps to configure the WAN Interface through Local Management.

1. Set the WAN connection Interface Number by typing the same number into the **Interface Number** field that was input into the Timeslots in the WAN Physical Configuration screen, then press ENTER (see NOTE on page 2-11).

2. Unless the user sets the Max Xmit Unit, the WPIM-E1 automatically sets the **Max Xmit Unit** to **8191** (default) after the active protocol (PPP) is selected.

3. If the E1 Line Coding is **HDB3** on the previous screen:

   a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **None**, then press ENTER.

   b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

   c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **BNCP**, then press ENTER.

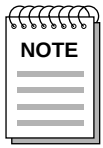
4. If the E1 Line Coding is **AMI** on the previous screen:

   a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **INV-HDLC**, then press ENTER.

   b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

   c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **BNCP**, then press ENTER.

5. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.

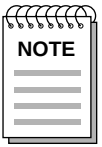


Upon saving this screen, the interface just configured is assigned to an application port (PT#) in the table on the right hand side of the screen.

The WAN configuration is complete. It takes up to 60 seconds for the WAN Interface to come out of standby and for communications to begin.

2.4 FRACTIONAL E-1 CONFIGURATION USING PPP

This section provides step-by-step instructions for configuring the WPIM-E1 to use a fractional E-1 circuit in a PPP environment. This example assumes the setup shown in figure 2-6 using two MicroMMAC hubs each with a BRIM-W6 containing a WPIM-E1. Configurations may vary depending on the hub. In a fractional E-1 setup, only a portion of the 32 Timeslots or DS-0's are used.



The terms DS-0 (Digital Signal, level 0) and Timeslot are used synonymously in this guide to represent a standard 64,000 bit/second channel.

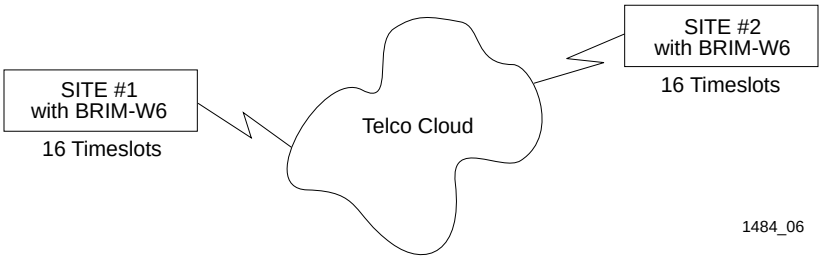


Figure 2-6. Fractional E-1 Configuration

The line configuration information shown in Table 2-2 must be supplied by the service provider.

Table 2-2. Telco Configuration Information

Configuration Information Required By User	Configuration Information Supplied By Service Provider
Line Coding	HDB3 or AMI
Frame Type	E1 or E1-CRC
Clock Source	Loop Timing or Local Timing
DS-0's (Timeslots)	Timeslots being used for each end of the circuit

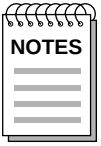
2.4.1 WPIM-E1 Physical Configuration

Begin the WPIM-E1 configuration by accessing the WAN Physical Configuration screen through Local Management (Figure 2-1). Proceed with the following steps:

1. Use the arrow keys to highlight the **[WPIM]** field at the bottom of the screen. Press the SPACEBAR to toggle the field to the WPIM being configured, then press ENTER.

2. Use the arrow keys to highlight **Timeslot View**. Press the SPACEBAR to select **New**, then press ENTER. The cursor moves to Timeslot #2 of the Timeslot Configuration Table.

3. Insert an interface number (see NOTE below) into every Timeslot being used (in the example shown in Figure 2-6, 16 Timeslots are being used, the rest have zeros in them). Type the number, press ENTER, then use the arrow keys to highlight the next Timeslot field. Exit this field by using the arrow keys.The cursor automatically moves to the **E1 Line Coding** field.



The value assigned to the Timeslots is the interface being used for WAN communication. The available interface range is displayed on the WAN Physical Configuration screen (see Figure 2-1). You may insert any of the available interface numbers into the Timeslots.

In the example shown in Figure 2-1, the interface range for the MicroMMAC with a WPIM-E1 in slot one of the BRIM-W6 is 2-33. Although any of these values may be used, Cabletron Systems recommends using the first available interface number (in this example interface #2).

The following three steps are based on information supplied by the service provider. Consult the service provider for the correct settings.

4. Use the arrow keys to highlight **E1 Line Coding**. Press the SPACEBAR to select **HDB3** or **AMI**, then press ENTER.

5. Use the arrow keys to highlight **E1 Frame Type**. Press the SPACEBAR to select **E1** or **E1-CRC**, then press ENTER.

6. Use the arrow keys to highlight **E1 Tx Clock Source**. Press the SPACEBAR to select **Local** (no clock source provided by telephone company) or **Loop** (clock source provided by telephone company), then press ENTER.

If you are using a Local clock source, set only one end of the circuit for Local, the other end must be set for Loop.

7. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.

8. Access the WAN Interface Configuration screen by using the arrow keys to highlight the **WAN Int Config** option and then press ENTER.

2.4.2 WPIM-E1 Interface Configuration

This screen is accessed through the WAN Physical Configuration screen. Proceed with the following steps to configure the WAN Interface through Local Management.

1. Set the WAN connection Interface Number by typing the same number into the **Interface Number** field that was input into the Timeslots in the WAN Physical Configuration screen, then press ENTER. (see NOTE on page 2-16).

2. Unless the user sets the Max Xmit Unit, the WPIM-E1 automatically sets the **Max Xmit Unit** to **8191** (default) after the active protocol (PPP) is selected.

3. If the E1 Line Coding is **HDB3** on the previous screen:

   a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **None**, then press ENTER.

   b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

   c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **BNCP**, then press ENTER.

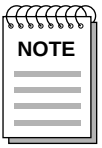
4. If the E1 Line Coding is **AMI** on the previous screen:

   a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **INV-HDLC**, then press ENTER.

   b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

   c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **BNCP**, then press ENTER.

5. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message “Save Done!” appears and Local Management saves the changes to memory.



Upon saving this screen, the interface just configured is assigned to an application port (PT#) in the table on the right hand side of the screen.

The WAN configuration is complete. It takes up to 60 seconds for the WAN Interface to come out of standby and for communications to begin.

2.5 FRAME RELAY CONFIGURATION

This section provides step-by-step instructions for configuring the WPIM-E1 to use an E-1 circuit in a Frame Relay environment. This example assumes the setup shown in figure 2-7 using two MicroMMAC hubs each with a BRIM-W6 containing a WPIM-E1. Configurations may vary depending on the hub.

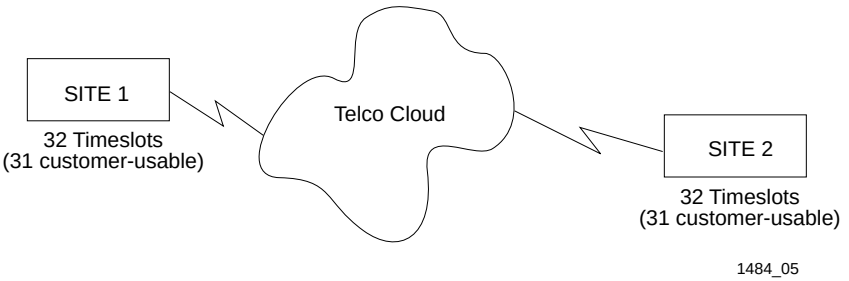


Figure 2-7. Frame Relay Configuration

The following information must be supplied to the service provider.

- LMP type: **Q.933-A**

The line configuration information shown in Table 2-3 must be supplied by the service provider.

Table 2-3. Telco Configuration Information

Configuration Information Required By Customer	Information Supplied By Service Provider
Line Coding	HDB3 or AMI
Frame Type	E1 or E1-CRC
Clock Source	Loop Timing or Local Timing
DSO's (Timeslots)	Timeslots being used for each end of the circuit

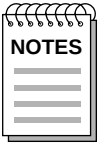
2.5.1 WPIM-E1 Physical Configuration

Begin the WPIM-E1 configuration by accessing the WAN Physical Configuration screen through Local Management (Figure 2-1). Proceed with the following steps:

1. Use the arrow keys to highlight the **[WPIM]** field at the bottom of the screen. Press the SPACEBAR to select the WPIM being configured, then press ENTER.

2. Use the arrow keys to highlight **Timeslot View**. Press the SPACEBAR to select **New**, then press ENTER. The cursor moves to Timeslot #2 of the Timeslot Configuration Table.

3. Insert an interface number (see NOTE below) into every Timeslot being used. Type the number, press ENTER, then use the arrow keys to highlight the next Timeslot field. Exit this field by using the arrow keys. The cursor automatically moves to the **E1 Line Coding** field.



The value assigned to the Timeslots is the interface being used for WAN communication. The available interface range is displayed on the WAN Physical Configuration screen (see Figure 2-1). You may insert any of the available interface numbers into the Timeslots.

In the example shown in Figure 2-1, the interface range for the MicroMMAC with a WPIM-E1 in slot one of the BRIM-W6 is 2-33. Although any of these values may be used, Cabletron Systems recommends using the first available interface number (in this example interface #2).

The following three steps are based on information supplied by the service provider. Consult the service provider for the correct settings.

4. Use the arrow keys to highlight **E1 Line Coding**. Press the SPACEBAR to select **HDB3** or **AMI**, then press ENTER.

5. Use the arrow keys to highlight **E1 Frame Type**. Press the SPACEBAR to select **E1** or **E1-CRC**, then press ENTER.

6. Use the arrow keys to highlight **E1 Tx Clock Source**. Press the SPACEBAR to select **Local** (no clock source provided by telephone company) or **Loop** (clock source provided by telephone company), then press ENTER.

If you are using a Local clock source, set only one end of the circuit for Local, the other end must be set for Loop.

7. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message “Save Done!” appears and Local Management saves the changes to memory.

8. Access the WAN Interface Configuration screen by using the arrow keys to highlight the **WAN Int Config** option and then press ENTER.

2.5.2 WPIM-E1 Interface Configuration

This screen is accessed through the WAN Physical Configuration screen. Proceed with the following steps to configure the WAN Interface through Local Management.

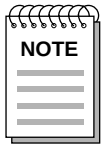
1. Set the WAN connection Interface Number by typing the same number into the **Interface Number** field that was input into the Timeslots in the WAN Physical Configuration screen, then press ENTER. (see NOTE on page 2-20).

2. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **None**, then press ENTER.

3. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **FR**, then press ENTER.

4. Use the arrow keys to highlight **FR LMP**. Press the SPACEBAR to select **Q.933-A**, then press ENTER.

5. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.



Upon saving this screen, the interface just configured is assigned to an application port (PT#) in the table on the right hand side of the screen once the device starts communicating with the service provider's switch.

The WAN configuration is complete. Communications between the WPIM-E1 and the service provider's switch takes approximately 1-2 minutes to begin. A status of **Inactive** appears until both ends of the PVC (Permanent Virtual Circuit) are configured. Once both end devices have negotiated link management with the switches, the status field reads **Active**.

2.6 LEX CONFIGURATION

This section provides step-by-step instructions for configuring the WPIM-E1 to operate in a LEX environment. LEX (LAN Extender) is a Cisco Systems protocol that allows a core router to communicate to a remote site using PPP.

The line configuration information shown in Table 2-4 must be supplied by the service provider.

Table 2-4. Telco Configuration Information

Configuration Information Required by User	Configuration Information Supplied by Service Provider
Line Coding	HDB3 or AMI
Frame Type	E1 or E1-CRC
Clock Source	Loop Timing or Local Timing

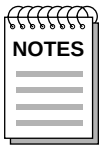
2.6.1 WPIM-E1 Physical Configuration

Begin the WPIM-E1 configuration by accessing the WAN Configuration screen through Local Management (Figure 2-1). Access the WAN Physical Configuration screen from the Feature Selection screen that first appears when you enter Local Management. Use the arrow keys to highlight the WAN Configuration option, then press ENTER. The screen shown in Figure 2-1 appears. Proceed with the following steps:

1. Use the arrow keys to highlight the **[WPIM]** field at the bottom of the screen. Press the SPACEBAR to select the WPIM being configured, then press ENTER.

2. Use the arrow keys to highlight **Timeslot View**. Press the SPACEBAR to select **New**, then press ENTER. The cursor moves to Timeslot #2 of the Timeslot Configuration Table.

3. Insert an interface number (see NOTE below) into every Timeslot being used. Type the number, press ENTER, then use the arrow keys to highlight the next Timeslot field. Exit this field by using the arrow keys.The cursor automatically moves to the **E1 Line Coding** field.



The value assigned to the Timeslots is the interface being used for WAN communication. The available interface range is displayed on the WAN Physical Configuration screen (see Figure 2-1). You may insert any of the available interface numbers into the Timeslots.

In the example shown in Figure 2-1, the interface range for the MicroMMAC with a WPIM-E1 in slot one of the BRIM-W6 is 2-33. Although any of these values may be used, Cabletron Systems recommends using the first available interface number (in this example interface #2).

The following three steps are based on information supplied by the service provider. Consult the service provider for the correct settings.

4. Use the arrow keys to highlight **E1 Line Coding**. Press the SPACEBAR to select **HDB3** or **AMI**, then press ENTER.

5. Use the arrow keys to highlight **E1 Frame Type**. Press the SPACEBAR to select **E1** or **E1-CRC**, then press ENTER.

6. Use the arrow keys to highlight **E1 Tx Clock Source**. Press the SPACEBAR to select **Local** (no clock source provided by telephone company) or **Loop** (clock source provided by telephone company), then press ENTER.

If you are using a Local clock source, set only one end of the circuit for Local, the other end must be set for Loop.

7. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message “Save Done!” appears and Local Management saves the changes to memory.

8. Access the WAN Interface Configuration screen by using the arrow keys to highlight the **WAN Int Config** option and then press ENTER.

2.6.2 WPIM-E1 Interface Configuration

This screen is accessed through the WAN Physical Configuration screen. Refer to Figure 2-4 and proceed with the following steps to configure the WAN Interface through Local Management.

1. Set the WAN connection Interface Number by typing the same number into the **Interface Number** field that was input into the Timeslots in the WAN Physical Configuration screen, then press ENTER. (see NOTE on page 2-23).

2. Unless the user sets the Max Xmit Unit, the WPIM-E1 automatically sets the **Max Xmit Unit** to **8191** (default) after the active protocol (PPP) is selected.

3. If the E1 Line Coding is **HDB3** on the previous screen:

    a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **None**, then press ENTER.

    b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

    c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **LEX**, then press ENTER.

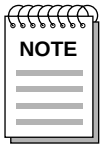
4. If the E1 Line Coding is **AMI** on the previous screen:

    a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **INV-HDLC**, then press ENTER.

    b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

    c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **LEX**, then press ENTER.

5. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message “Save Done!” appears and Local Management saves the changes to memory.



Upon saving this screen, the interface just configured is assigned to an application port (PT#) in the table on the right hand side of the screen.

The WAN configuration is complete. It takes up to 60 seconds for the WAN Interface to come out of standby and for communications to begin.

APPENDIX A

WAN INTERFACE CABLE SPECIFICATIONS

This appendix provides the Cabletron Systems part numbers and connector information for the WPIM-E1 Line Interface Cables.

Table A-1. Cabletron WPIM-E1 Cable Part Numbers

Interface Cable	Cabletron Part Number
20 foot E1 Line Interface Cable	9372095-20[a]
E1 Line Interface Cable	9372095-L[b]

a. Standard 20 foot E1 Line Interface Cable.
b. (L denotes length required in feet or meters). For example: 9372095-3 denotes a 3 foot cable; 9372095-3M denotes a 3 meter cable.

Table A-2. WPIM-E1 Connector Information

Cabletron interface cable part number	9372095-L
Description	E1 line interface cable
Connector 1	RJ45
Connector 2	RJ45

Table A-3. WPIM-E1 RJ45 Connector Pin Assignments

Pin	Signal
1	Receive Ring
2	Receive Tip
3	Shield Ground
4	Transmit Ring
5	Transmit Tip
6	Shield Ground
7	Not Used
8	Not Used

Table A-4. RJ45 DTE Pin Assignments

Pin	Signal
1	Receive Ring
2	Receive Tip
3	Shield Ground
4	Transmit Ring
5	Transmit Tip
6	Shield Ground
7	Not Used
8	Not Used

Table A-5. RJ45 Network Pin Assignments

Pin	Signal
1	Receive Ring
2	Receive Tip
3	Not Used
4	Transmit Ring
5	Transmit Tip
6	Not Used
7	Not Used
8	Not Used

APPENDIX B

WAN TERMS AND ACRONYMS

This appendix provides definitions for WAN terms and acronyms.

AMI	Alternate Mark Inversion, line coding used with both E-1 and T-1. A digital 1 is encoded as a “mark” (pulse) and a 0 is encoded as a “space.” The marks alternate polarity.
ANSI	American National Standards Institute, the US member of the ISO.
Bearer (B) Channel	A 64 Kbps channel used with BRI and PRI ISDN services.
Bipolar Violation	The occurrence of two successive pulses of the same polarity in a bipolar signal.
B8ZS	Binary 8-Zero Substitution, line coding utilized with ESF (Expanded Super Frame). Insures the ones density requirement for digital T-carrier facilities in the public network, while allowing 64 Kbps clear data per channel.This encoding method is not supported by some Telcos.
BRI	Basic Rate Interface, minimum rate ISDN subscriber interface, provides 2 B + 1 D channels (two 64 Kbps “B” (Bearer) channels and one 16 Kbps “D” (Data) signaling channel for a total of 144 Kbps).
BRIM	Cabletron Systems Bridge Router Interface Module. Expands the physical connectivity of a host device.
CRC	Cyclic Redundancy Check, an algorithm or process used to identify corrupted packets in the transmission link.
CSU	Channel Service Unit, a device that terminates the local loop/digital channel on a customer’s (DSU) premises. The CSU connects to a DSX-1 interface on the CPE.

DCE	Data Communications Equipment, a device such as a modem that connects the communications circuit with the end device (see DTE).
Data (D) Channel	A 16 Kbps channel used with BRI and PRI services for signaling and control.
D4	D4 Framing, a popular framing format in T-1. Uses 12 T-1 Frames to identify both the channel and the signaling bit.
DLCI	Data Link Connection Identifier, a unique virtual circuit identifier used in Frame Relay. Identifies a given frame as being from a particular logical link. The DLCI has only local significance.
DSU	Digital Service Unit, converts RS-232 or other terminal interfaces to DSX-1 (T-1) interface.
DS-0	Digital Signal, level 0, a standard 64,000 bit/second channel. Synonymous with "Timeslot."
DTE	Data Terminal Equipment, equipment that originates and terminates data transmission such as a computer or printer (see DCE).
E-1	European digital signal level 1. Similar to T-1 but provides 32 channels (2.048 Mbps) instead of 24 channels (1.544 Mbps).
ESF	Extended Super Frame. A new T-1 framing standard (see D4 framing) that uses 24 T-1 frames, thus allowing individual identification of the channel and signaling bits.
Fractional T-1	Use of a portion (less than the full 24 channels) of a T-1 line.
Frame Relay	A network protocol that allows for many point-to-point virtual connections over a single access channel.
HDB3	High Density Bipolar 3, used with E-1, a bipolar coding method that does not allow more than 3 consecutive zeros.
HDLC	High-Level Data Link Control, layer 2 (link layer) full-duplex protocol derived from SDLC.
INV. HDLC	A form of zero suppression in which all zeros in the HDLC packet are changed to ones and all ones are changed to zeros.

ISDN Integrated Services Digital Network. Allows point-to-point connections at 64 Kbps or 128 Kbps when necessary and disconnects the line when not in use. With this service the user only pays for the time connected.

JBZS Jam Bit-Zero Suppression, a form of zero suppression that places a one in the seventh bit of a timeslot. Reduces the effective throughput to 56 Kbps.

LEX LAN Extender, a Cisco Systems protocol used to internetwork a host-based router with a remote switch.

LMP Link Management Protocol, used in Frame Relay. Allows the device to gather information about the DLCIs (Data Link Connection Identifiers) See T1.617-D, Q.933-A.

Local Timing Timing for digital transmission circuit is internally generated by a source within the equipment. Usually used for short haul private lines. In this case one CSU must be set for Local (internal) timing and the CSU at the other end of the line must be set for Loop (recovered) timing to create a master-slave situation.

Loop Timing Timing for digital transmission circuit is recovered from the received data, not generated internally by a source within the equipment. This is the typical situation when using public lines.

MIM Media Interface Module, Cabletron Systems products designed to fit in a Multi Media Access Center (MMAC) hub.

MUX Multiplexer, an electronic device that allows two or more signals to pass over one communications circuit.

PPP Point-to-Point Protocol, provides a method for transmitting datagrams over serial point-to-point links.

PRI Primary Rate Interface, an ISDN service providing 23 “B” (Bearer) channels of 64 Kbps and one 64 Kbps “D” (Data) channel for signaling and control.

PVC Permanent Virtual Circuit, a virtual circuit that provides the equivalent of a dedicated private line service.

Q.933-A Q.933 Annex A, an ITU link management protocol specification used in Frame Relay.

SDLC	Synchronous Data Link Control, layer 2 (link layer) protocol developed by IBM for SNA connectivity. Basis for HDLC.
SNA	Systems Network Architecture, data communication network architecture developed by IBM in the 1970's.
T-1	A Bell System term that refers to the physical carrier used to transmit a digital signal at 1.544 Mbps.
T1.617-D	T1.617 Annex D, an ANSI link management protocol specification used in Frame Relay.
TDM	Time Division Multiplexing, a technique in which separate data or voice signals are transmitted simultaneously over a single communications medium based on time interleaving.
Timeslot	A standard 64,000 bit/second channel. Synonymous with DS-0 (Digital Signal, level 0).
WAN	Wide Area Network, a network spanning a large geographic area.
WPIM	WAN Physical Interface Module, Cabletron Systems modules that provide connectivity/functionality for WAN modules such as the BRIM-W6.